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# PATENT SPECIFICATION

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Date of filing Complete Specification: March 23, 1953.

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## COMPLETE SPECIFICATION

### Improvements in or relating to Filters for Mouthpiece Cigarettes and other Smoking Purposes

PATENTS ACT, 1949

SPECIFICATION NO. 741,416

Reference has been directed, in pursuance of Section 8 of the Patents Act, 1949, to Specification No. 741,429.

THE PATENT OFFICE,  
26th October, 1956

DB 39594/1(2)/3613 100 10/56 R

10 consist of the filter element made of crepe-  
paper or crepe-paper combined with an  
absorbent such as cotton wool or cellulose  
wadding or the like, and a further filter ele-  
20 ment consisting of a piece of cotton wool or  
other absorbent material. When assembled  
with a cigarette, the double-filter is so dis-  
posed that the first mentioned filter is at the  
end of the cigarette while the second men-  
25 tioned filter lies between the first filter and  
the tobacco. In the copending applications  
Nos. 4128/53 and 6885/53 (Serial No.  
741,429, multiple filters containing crystals or  
chemicals are described and the present inven-  
30 tion may be also applied to these. As a crepe  
filter, with or without combined absorbent  
material, is a comparatively rigid body it will  
be termed herein a "filter plug" or "plug"  
which terms when used mean exclusively such  
35 a filter. These plugs, the applicant believes,  
do not completely filter the tobacco smoke,  
yet a plug is by far the most comfortable  
filter element to put into the extreme mouth  
end of a cigarette and it enjoys wide popu-  
40 larity. Therefore, the ideal arrangement is to  
have a plug for the said mouth end and an  
efficient filter between the plug and the  
tobacco.

45 A suitable filtering element to meet this  
latter object and made of cotton wool of suit-  
able size, shape and consistency is prepared  
as described later. A wool filter (except when

[Price 3s. 0d.]

These filters are tubular in form and fairly  
rigid, being made of such materials as plastic,  
cardboard or glass tubes and containing such  
substances as cotton wool or nicotine-absorb-  
65 ing crystals of a suitable chemical salt. In  
the latter case the tube has discs fitted at its  
ends to contain the crystals and the discs are  
perforated to allow smoke to pass through  
the tubes. It is highly desirable to adapt such  
70 filters to cigarettes as many people do not  
care for using holders but these filters, par-  
ticularly those containing chemicals, are not  
suitable for putting in the mouth. One object  
of the invention is to provide a double filter,  
75 one element of which consists of such a filter  
called hereafter a "tube filter" while the  
other element which is fitted at the extreme  
mouth end of the cigarette is a filter plug  
as previously defined.

80 Sometimes mouthpiece cigarettes are manu-  
factured by joining two pieces of cigarette  
rod (i.e. short cigarettes) to a double-length  
filter element and then cutting the latter at  
its mid-length to produce two mouthpiece  
85 cigarettes. This method may be used for mak-  
ing a short composite rod long enough to  
provide even six mouthpiece cigarettes but  
generally speaking the large scale manufacture  
of filter cigarettes is carried out by two  
90 methods described in more detail later, and  
usually known as the "rod," and "assembly"  
methods respectively; and a further object of

Price 4s. 6d.

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## COMPLETE SPECIFICATION

### Improvements in or relating to Filters for Mouthpiece Cigarettes and other Smoking Purposes

I, HEDWIG GAMBLE, a British Subject, of 19 Markham Street, London, S.W.3, do hereby declare this invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention concerns improvements in or relating to the manufacture of filters for mouthpiece cigarettes and other smoking purposes and having two or more filtering elements of different filtering material. Such composite filters having two elements are broadly known and are usually termed double filters and often consist of the filter element made of crepe-paper or crepe-paper combined with an absorbent such as cotton wool or cellulose wadding or the like, and a further filter element consisting of a piece of cotton wool or other absorbent material. When assembled with a cigarette, the double-filter is so disposed that the first mentioned filter is at the end of the cigarette while the second mentioned filter lies between the first filter and the tobacco. In the copending applications Nos. 4128/53 and 6885/53 (Serial No. 741,429, multiple filters containing crystals or chemicals are described and the present invention may be also applied to these. As a crepe filter, with or without combined absorbent material, is a comparatively rigid body it will be termed herein a "filter plug" or "plug" which terms when used mean exclusively such a filter. These plugs, the applicant believes, do not completely filter the tobacco smoke, yet a plug is by far the most comfortable filter element to put into the extreme mouth end of a cigarette and it enjoys wide popularity. Therefore, the ideal arrangement is to have a plug for the said mouth end and an efficient filter between the plug and the tobacco.

A suitable filtering element to meet this latter object and made of cotton wool of suitable size, shape and consistency is prepared as described later. A wool filter (except when

enclosed in a cardboard tube) is not so rigid as the filter plug previously mentioned and it will be referred to as a "filter wad" or "wad." Sometimes as explained later, a wad has an outer layer or thin skin of cellulose or is enclosed in a thin paper tube and other absorbent materials physically similar to wool are sometimes used. Thus "wad" means a filter of wool or like materials, with a thin skin where desired, and its shape and consistency should be such as to ensure that all the smoke passes through it.

There are other kinds of filters known and used in connection with cigarette holders. These filters are tubular in form and fairly rigid, being made of such materials as plastic, cardboard or glass tubes and containing such substances as cotton wool or nicotine-absorbing crystals of a suitable chemical salt. In the latter case the tube has discs fitted at its ends to contain the crystals and the discs are perforated to allow smoke to pass through the tubes. It is highly desirable to adapt such filters to cigarettes as many people do not care for using holders but these filters, particularly those containing chemicals, are not suitable for putting in the mouth. One object of the invention is to provide a double filter, one element of which consists of such a filter called hereafter a "tube filter" while the other element which is fitted at the extreme mouth end of the cigarette is a filter plug as previously defined.

Sometimes mouthpiece cigarettes are manufactured by joining two pieces of cigarette rod (i.e. short cigarettes) to a double-length filter element and then cutting the latter at its mid-length to produce two mouthpiece cigarettes. This method may be used for making a short composite rod long enough to provide even six mouthpiece cigarettes but generally speaking the large scale manufacture of filter cigarettes is carried out by two methods described in more detail later, and usually known as the "rod," and "assembly" methods respectively; and a further object of

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the invention is to enable a composite filter of the kind hereinbefore set forth to be incorporated with a cigarette by any of these methods.

- 5 The term "composite filter" as used here-  
after means a plug as hereinbefore defined  
and one or more other or "second" filters,  
and as when the composite filter is incor-  
porated in a cigarette the plug is to be at  
10 an end thereof and the main object of the  
invention is to enable such composite filters  
to be incorporated with cigarettes by the  
methods mentioned above, the carrying of the  
invention into effect requires the production  
15 of a short rod consisting of a single length  
of one such other filter at each end and a  
double-length plug between. Such a piece or  
rod is termed hereafter a "composite-filter  
component" or "double-filter component."  
20 For convenience in feeding filter elements to  
machines for making mouthpiece cigarettes it  
is usual to use short rods of filter material  
equal to say, six complete filters, and to cut  
them into three shorter rods during feeding.  
25 It has already been proposed in Specifica-  
tions Nos. 430,817 and 487,069 to provide  
a composite mouthpiece constituted in part  
by a length of wrapped cigarette rod and in  
part by a length of filter or flavouring  
30 material or by a tubular mouthpiece either  
hollow or entirely or partly filled with filter  
or flavouring material.

- Further it has been proposed in Specifica-  
tion No. 687,878 to provide a mouthpiece  
35 cigarette with a double filter consisting of a  
crepe paper or like plug at the extreme end  
with a wool wad between the plug and the  
tobacco of the cigarette and for the purpose  
of making such a cigarette a double length  
40 plug and two wads are fed separately to a  
machine where these items are assembled with  
pieces of cigarette rod to provide a composite  
rod which is bisected to produce cigarettes.  
At the moment the assembly is complete, that  
45 part of the composite rod consisting of the  
double length plug with a wad at each end,  
all joined together, forms an item similar to  
the composite filter component forming the  
subject of the present invention. However in  
50 the present case the component is a separate  
entity suitable for insertion between lengths  
of cigarette rod to be joined thereto in the  
formation of mouthpiece cigarettes.

- According to the invention, there is pro-  
vided a composite-filter component for mouth-  
55 piece cigarettes and other smoking purposes  
comprising single length second filter elements  
separated by a double-length filter plug, the  
elements being fixed together in axial align-  
ment, for example enclosed within a tube, said  
60 component being adapted for feeding to a  
machine where it can be joined to pieces of  
cigarette rod in the production of mouthpiece  
cigarettes. Where the second filters are wads,  
65 the neighbouring ends of a wad and a plug

may be attached by adhesive or by the piercing  
method where a needle or the like is driven  
through a wad and into the plug where it  
carries a few fibres of the wad, and in some  
cases the elements may be joined in this way,  
70 without having a surrounding tube. In the  
case where a filter plug has a tube filter next  
to it, the two elements are best assembled by  
enclosure in a wrapper or tube and a wrapper  
is essential when the tube filter is a crystal  
75 containing tube.

A wad may be enclosed in a tube of paper  
during manufacture to facilitate handling dur-  
ing the manufacture of the composite-filter  
component and provide a stiffer product when  
the composite filter is associated with a  
80 cigarette. The invention also includes several  
composite-filter components joined together as  
a short rod to facilitate feeding to a machine  
as noted above.

The invention will be more fully described  
with reference to the accompanying drawings  
in which:—

Fig. 1 is a section of a cigarette provided  
with a double-filter consisting of a crepe plug  
90 at one end followed by a second filter consist-  
ing of a filter wad.

Fig. 2 is a perspective view of the second  
filter used in Fig. 1.

Fig. 3 is a perspective view of another kind  
95 of second filter.

Fig. 4 is a perspective view of yet another  
kind of second filter.

Fig. 5 shows a double filter component consist-  
ing of a double-length plug with single  
100 wads attached at each end.

Fig. 6 shows a double-filter component consist-  
ing of a double-length plug with single  
wads at each end, the several pieces being  
105 contained in a tube.

Fig. 7 shows a double-filter component consist-  
ing of a double-length plug and tube filters,  
at each end, the several pieces being joined  
together by enclosure in a tube.

Fig. 8 shows one way of uniting or  
110 assembling pieces of cigarette rod with a  
double-filter component of the kind shown in  
Fig. 5.

Fig. 9 shows how a composite rod of double-  
filter components, of the kind shown in Fig.  
5, and cigarette rods is made by the  
115 "assembly" method.

Fig. 10 shows how a composite rod of  
double-filter components, as shown in Fig. 6,  
and tobacco sections, is made by the "rod"  
120 method.

Fig. 11 is a sectional elevation of a diagram-  
matic nature showing how double-filter com-  
ponents like those of Fig. 5 can be made.

Fig. 12 is an end elevation of Fig. 11.

Fig. 13 is a sectional elevation of a similar  
nature to Fig. 11, showing a different way of  
joining the elements of the double-filter com-  
ponent.

Fig. 14 shows another way of making 130

double-filter components, the product being like Fig. 6.

Fig. 15 shows a piece of filter material comprising three double-filter components.

Figure 16 shows a double-filter component in which the elements are separated by spaces.

Fig. 17 is a multiple-filter component with crystals between a double-length plug and two wads.

Figure 18 and 19 show diagrammatically a device for making the component shown in Fig. 17.

Fig. 20 is a modification of Fig. 18.

Referring first to Figs. 1 to 6, there is shown in Fig. 1 a section of a mouthpiece cigarette, having a filter plug 1 at the end, this plug being made of any of the usual materials, namely, crepe paper alone, crepe paper and cellulose, or crepe paper and cotton wool. There is provided a second filter 3 which wholly fills the cross section of the paper tube 2. The second filter in Fig. 1 consists of a filter wad 3 shown in Fig. 2 and described in more detail later. In Fig. 3 the second filter 4 is an example of a tube filter consisting of a cardboard tube filled with cotton wool of uniform consistency. In Fig. 4, the second filter 5 is a tube, made of plastic material, containing nicotine-absorbing crystals of a suitable chemical salt and having ends which are perforated to allow the passage of smoke.

The filter plugs 1 are made in any usual manner and need no further description.

For filter wads 3, a piece of pre-pressed cotton wool of substantially uniform consistency is used. One type of such cotton material is known as "cotton wool rolls" and is in use for many other purposes, for example, by dentists and the medical profession. This material which is starched, pressed and baked as noted below, is in rod form, absolutely round-shaped and it can be made to a diameter which will fit perfectly into the paper wrapper or a cigarette in the same manner as a crepe paper plug. Such compressed cotton wool can either be applied to the double-filter component making machine in the form of rods and cut in the machine to the required length, or loose cotton wool can be made into rod shape by the above-mentioned process in direct combination with said machine and the two manufactures perfected in one operation.

To ensure that the compressed cotton wool is a good fit in the paper tube 2, of Fig. 1, so as to ensure complete filtering, it may be made to a diameter slightly larger than the diameter of the tube 2. Thus during the assembly or like operation it can be further compressed to a diameter slightly smaller than the diameter of the finished cigarette, so that the filter wad can, due to its elastic nature, expand when released in the interior of the tube. The wad or the wool rod from which it is made may have an outer layer of cellu-

lose, which is pressed, starched and baked to provide a wad of a certain stiffness and help to retain the wad to shape and size. The general appearance of such a wad is shown in Fig. 2.

A cotton wool filter of perfect round shape can also be obtained by pressing a soft cotton wool rope with pressure rollers and inserting the rod into a cigarette paper tube which keeps the cotton filter in the correct shape. The same type of wad can also be made by using a similar process as on continuous rod cigarette making machines. The rope is brought with a cigarette paper web on to a moving band and fed through a garniture which forms the round shape. Glueing or crimping of the seam of the cigarette paper edges is carried out at the same time which results in obtaining an endless rod of a cigarette paper tube filled with compressed cotton wool which rod is finally cut into the required filter lengths to provide the wads. Such a wrapped wad is rather similar to the tube filter of Fig. 3 except that the wool is enclosed by a paper tube of negligible thickness so that the result is a wad rather than a tube filter as formerly defined.

As previously remarked, in the large-scale manufacture of filter cigarettes, there are two general methods employed, though various minor differences in either method occur as between one maker and another.

The first or "rod" method consists broadly in somehow feeding mouthpieces in between tobacco portions in the rod-forming part of a continuous rod cigarette machine, and cutting up the resulting composite rod to obtain separate cigarettes. Double-length mouthpieces are used and spaced apart by double-length portions of tobacco and the final rod is cut through midway of the mouthpieces and the tobacco portions.

The second or assembly method will be described presently after reference to another way of achieving the same result. In this other way, see Fig. 8, assembly is carried out by winding a tip around a double-length mouthpiece arranged between two pieces of cigarette rod (or short cigarettes) and dividing the product into two. This method is shown in Fig. 8 and it will be readily understood that several double-length mouthpieces and double-length pieces of cigarette rod can be joined in this manner in one operation. But, obviously only a limited length of composite rod can be made like this. The "assembly" method referred to above is done by joining double-length mouthpieces and double-length pieces of cigarette rod (i.e. each twice the length of the tobacco part of a finished mouth-piece cigarette) by tips of cork or paper formed into a band around the joins between the pieces and the operation is continuous so that a moving composite rod is formed which is cut into separate cigarettes just the same as

in the first method.

For both rod and assembly methods it is necessary to feed mouthpieces to the machine in which the mouthpiece cigarettes are made but it is only possible in the known art to feed single pieces of filter material (e.g. double-length plugs) from a magazine or stacker or other container to the rod or assembly machine, to provide a filter mouthpiece for each finished cigarette and this mouthpiece must be in the form of a plug of a fairly hard nature to withstand the pressure applied to the cigarettes from both sides, in order to obtain a proper join either of the cigarette tube or the cork tip, as the case may be. It is not possible to produce by these methods as hitherto practised double-filter mouthpiece cigarettes whereby, in addition to the filter plug a soft piece of cotton wool is placed between the plug and cigarette or tobacco. Even when, instead of a soft piece of cotton wool a comparatively stiff second filter such as a pre-compressed piece of cotton wool or wad which is nearly of plug shape is used instead of a soft cotton wool piece, no known machine permits three pieces of filter, i.e. three separate filter elements, to be fed in to the rod line instead of a double length mouthpiece. Nor does the assembly method of Fig. 8 in which a double-length mouthpiece is joined with one short cigarette on either side by rolling a glued band of cork or paper round the plug and cigarette ends easily permit the feeding in of more than one plug as the second filters are necessarily short and difficult to feed.

In order then to adapt double filters according to the invention to these various processes, plugs and second filters are joined in the various ways shown in Figs. 5 to 7 which will now be briefly described.

In Fig. 5 a filter wad 3 is attached to each end of a double-length plug 1 by glue between adjacent ends, or alternatively, by piercing the wad by a sharp point which drives some shreds of cotton wool into the plug. In Fig. 6 the wads 3 and plug 1 are enclosed in a paper tube 7, the components being further joined, if desired, by adhesive or piercing.

Fig. 7 shows a double-filter component consisting of a double-length plug 1 and a tube filter 5 at each end thereof, this second filter being of the kind containing nicotine-absorbing crystals, the three pieces being held in a paper tube 7. The same arrangements can, of course, be used where the second filter is a cardboard tube, as Fig. 3, containing cotton wool.

The double-filter components of Figs. 5, 6 and 7 can be attached to two pieces of cigarette rod by rolling a cork or like tip 8, Fig. 8, around the two pieces of cigarette rod and a double-filter component. The resulting assembly of cigarette rods and double-filter component is then cut at the broken line C—

C to provide two cigarettes. Sometimes more than two cigarettes at a time are made in this way. Similarly such double-filter components can be used when making mouthpiece cigarettes by the assembly method of making a composite rod and then cutting the rod. This assembly method is illustrated diagrammatically in Fig. 9. The double-filter components illustrated are as shown in Fig. 5 but, obviously, those of Figs. 6 or 7 can be substituted without difficulty. The double-filter components are joined by bands 8 of tipping material to pieces of cigarette rod to form a composite rod which moves as indicated by the arrow and is cut through at the broken lines C—C to produce separate cigarettes.

If the aforesaid "rod" method is used, the arrangement is as shown in Fig. 10 where double-filter components like Fig. 6 are shown, though clearly those of Figs. 5 and 7 can be employed instead. The filter pieces are inserted in spaces between the tobacco 6 and the whole assembly is enclosed in the cigarette paper 2 forming a continuous rod. The rod moves as indicated by the arrow and is cut at the lines C—C.

As is well known filter elements are usually fed from a hopper or the like to mouthpiece cigarette making machines in the form of multiple lengths usually equal to six separate filters and sub-divided during feeding. This practice is followed where possible in the present case, the filter material placed in the hopper consisting of rods comprising three composite-filter components which are cut into three separate components, then joined to the cigarette rod or like, material and finally sub-divided into separate composite filters.

The joining together of double-length filter plugs and filter wads to form double-filter components of the kind shown in Fig. 5 can be achieved in different ways. One way is shown in Figs. 11 and 12. Three overlapping discs 20, 21 and 22 whose combined width is approximately equal to the length of the component to be made, the discs 20, 22 being thinner than the disc 21, are rotating intermittently as indicated by the stepped arrows in Fig. 12. All three discs have a number of holes 23 in discs 20 and 22, and 24 in disc 21, parallel to their axes and equally spaced around their axes to receive a filter element. The middle disc rotates on a shaft 25 and the other two together on parallel shaft 26. The distance between the two discs 20 and 22 rotating on the shaft 26 is such that it is slightly greater than the width of the centre disc 21. The distance between the two shafts is such that in one position, see Fig. 12, three holes one belonging to each of the three discs are in alignment.

Into a hole 24 of the middle disc, a piece of crepe-paper plug or filter plug of double

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length is pushed in by any known means. As illustrated, a filter plug rod 27 formed by rolling or pressing is pushed into the hole by concave feeding rollers 28 and cut by an oscillating disc knife 29 so that the cut piece remains in the hole. This operation is performed while the disc is still, or at one station. The width of the middle disc 21 is slightly shorter than the length of the filter plug. As shown at the top of Fig. 11, the filter plug rod is pushed through to project at one side. At another station of the discs a drop of glue is provided on the ends of the plug at both sides of the disc by any means such as a pad, glue roller or the like. As shown, rollers 30 receiving gum from transfer rollers 31 supply it to the ends of the filter plug, which is pushed in slightly to centralise it in the disc by the left hand roller 30.

Into a hole of each outer disc 20 and 22, a piece of soft cotton wool or a piece of a compressed cotton wool rod is inserted while the discs are still, or at another station. This operation can also be done by any known means; the compressed cotton wool piece, by pushing it in the same manner as above mentioned for a crepe paper plug; the piece of soft cotton wool in a similar way by cutting a piece off a rope of soft cotton wool and pushing it into the hole by a pusher which consolidates the wool to uniform size and consistency to form a wad.

When the said holes of all three discs reach the station where they are in alignment, a pusher 32 from outside pushes all three pieces together through the discs and out at the other side, and by the pusher action the three pieces are further compressed owing to the resistance of the walls of the holes. They are tightly pressed together and the glue sticks the three parts together to form one filter piece or double-length mouthpiece, see Fig. 11, the product being like that of Fig. 5. From this position, the double-length mouthpieces can be assembled in a stacker or brought direct into the machine which assembles these mouthpieces with a tobacco rod or a cigarette, to make double-filter cigarettes. It will be understood that the views are diagrams simply to show how the filter pieces can be made.

The use of glue can be avoided by joining a crepe paper plug together with two filter wads of cotton wool by the piercing method. Here the two cotton wool pieces on each side of the plug can be pierced in by a needle into the ends of the plug in a known way, so that some wool fibres penetrate the plug and hold the wool in position.

In this case the three discs 35, 36 and 37 can be mounted co-axially on one shaft 38 and rotate intermittently together, as shown in Fig. 13. At one station a double-length filter plug is inserted in the hole of the middle

disc 36 through the corresponding hole of the outer disc 35 the operation being effected by a pusher 39. At another station a piece of soft cotton wool or a wad is fed into the holes of each outer disc 35 and 37 respectively. In Fig. 13 the feeding of the wad is shown as by concave rollers feeding rods of cotton wool, previously described, pieces being cut off by disc knives 38 like the knife 29 in Figs. 11 and 12. At a subsequent station both cotton wool pieces are pierced into the ends of the plug by needles 40, and then finally in another station not shown, the combined plug and wad filters are pushed out just as in Fig. 11 to be further used as above, thus providing a double-filter component.

The components according to Fig. 6 can also be made by the continuous rod method. Here, as shown in Fig. 14, on to an endless band 45 by any known way, a piece of cotton wool rod or the like of double the length of the wad in a double-filter cigarette is alternated with a piece of pre-formed crepe-paper plug of double length. The resulting rod is cut through midway of the wool sections to produce double-filter components. The materials are fed from side by side magazines 46 and 47 by a grooved drum 48 which deposits them on a paper web 49 carried by the band 45.

The plug piece can alternatively be cut off from a long plug in the form of a rod and brought onto the band, or it can be formed direct in the machine by pressing or rolling a piece of crepe-paper into the round shape. The piece of cotton wool can be cut off from a rope of cotton wool suitably shaped and pressed to the desired consistency, or from a rod of pre compressed cotton wool.

The band 45 is moving together with the band 49 of cigarette paper on top, as on all cigarette-rod machines, and the band, cigarette paper web and the continuous stream of alternate plugs and cotton wool pieces goes through a garniture indicated diagrammatically at 50 with the usual glueing apparatus which forms an endless rod which is then cut by any known cut-off arrangement 51 into composite-filter components having a double-length plug in the middle of two cotton wool wads. Thus, a short rod or composite-filter component is obtained of the kind shown in Fig. 6 and consisting in the centre of a plug of double length, which is joined on each side with a cotton wool filter wad.

To achieve a tight join between the plug and cotton wool pieces, there is provided above the band at a position in advance of the garniture a roller 52 which rotates with a higher peripheral speed than the speed of the moving band. The roller has such a diameter that it touches the plug when it moves along and passes beneath the roller. By its greater speed it pushes the plug forward on the band until it is a certain distance from the plug

in front and compresses slightly the intervening cotton wool piece.

Instead of the roller, any other means of accelerating the speed of the plug in relation to the speed of the moving band can be used.

The manufacture of a composite mouthpiece, where the second filter is to be one of the tube filters previously mentioned, is best conducted by the disc method in much the same manner as where filter plug and filter wad material are to be joined, as it is not possible to make a continuous rod of the elements since it is necessary to keep the tube filters where made of glass or plastic, in their original form and cutting is out of the question anyway, even if the contents of the tube were of some different nature. Where the tube filter is a cardboard tube fitted with wool or the like, the manufacture can be done by the rod method for the tube is not very thick as a rule, and can be cut like a cigarette rod.

When the components are made as described with reference to Fig. 14, the resulting rod is preferably cut to produce pieces like those shown at Fig. 15 where three components are joined as a short rod. As these rods are fed to the assembly or like machine, they are cut into three pieces on the lines D—D and each piece enters the rod line as a separate item.

In some cases the elements of a multiple filter may be spaced apart as it is found that in such a space, condensation and deposition of substances produced by burning tobacco takes place, see Fig. 16.

The apparatus shown in Figs. 18 and 19 comprises a drum indicated by the reference 60 and made up of five side-by-side sections or discs 61, 62 and 63. The control section 61 has a circle of holes 64 in it, aligned with a similar circle of holes 65 in the discs 63. Each hole 64 is suitable to take a double-length crepe plug. The discs 62 each have a circle of flutes, the flutes 73 being concentric with the holes 64 and 65. The flutes are to receive nicotine-absorbing crystals discharged from chutes 66. The holes 65 are to receive wads. Shrouds 67 cover the flutes for nearly 90° of the drum circumference to prevent crystals from falling out of the flutes. The drum moves intermittently and at one position for instance at 68, a crepe plug is pushed through the outer discs at one side into the centre section. Such a plug is indicated by vertical hatching. At the top position, crystals fall into the flutes and a little later say at 69 the wads are pushed into the holes 65. The wads might of course be pushed in at say, 70 before the crystals enter the aligned flutes. In both cases wads are indicated by horizontal hatching, dots being used at 70. When a line of holes and flutes loaded in this manner, reaches the discharge position at 71, the shrouds 67 end and are replaced by curved lugs 72. A push rod (not shown) moves

through the line of holes and flutes and pushes the assembly through a spoon into a paper or thin cardboard tube in the usual manner. It will be understood that the crystals may be closed up as shown in Fig. 17 by pressing the wads in farther.

In Fig. 20, all the drum sections are fluted, shrouds 67 control the crystals as before while shrouds 74 of larger radius control plugs and wads. This arrangement permits plugs and wads to be fed to the drum by lateral instead of axial movements.

The product of either Fig. 18 or Fig. 20 is a composite-filter component of the kind shown in Fig. 17 which is bisected to produce two composite filter elements. It will be readily seen that any of the composite-filter components described, can be divided into two pieces to be used for other purposes in smoking, for example in pipes and cigars.

What I claim is:—

1. A composite-filter component for mouthpiece cigarettes and other smoking purposes comprising single length second filter elements, as herein defined, separated by a double-length filter plug, the elements being fixed together in axial alignment, said component being adapted for feeding to a machine where it can be joined to pieces of cigarette rod in the production of mouthpiece cigarettes.

2. A composite-filter component as claimed in claim 1 and for double filters, wherein each second filter consists of a filter wad.

3. A composite-filter component as claimed in claim 1 and for double filters, wherein each second filter is a tube filter consisting of a cardboard tube filled with cotton wool compressed to the desired consistency.

4. A composite-filter component as claimed in claim 1 and for double filters wherein each second filter is a tube filter consisting of a tube having perforated ends and containing nicotine-absorbing crystals.

5. A composite-filter component as claimed in claim 2 or claim 3, wherein the filter elements are held in axial alignment by adhesive applied to the adjacent ends thereof.

6. A composite-filter component as claimed in claim 2 or claim 3 wherein the filter elements are held in axial alignment by piercing the cotton wool of the wad or the tube filter respectively into the material of the plug element.

7. A composite-filter component as claimed in any one of claims 2 to 6 wherein the elements are held in axial alignment by enclosure in a tube.

8. A composite-filter component as claimed in claim 1 comprising a double-length filter plug at the ends of which are crystal or other chemical filter elements, other second filter elements such as wads being disposed beyond the crystals on like to retain them in position and the whole of the elements being contained in a tube or wrapper.

9. A composite-filter component as claimed in claim 1 comprising a double-length filter plug separated by spaces from two second filter elements such as wads, the whole of the elements being contained in a tube.

10. An intermediate product comprising several composite-filter components as claimed in any one of the preceding claims joined end to end in the form of short rod.

11. Apparatus for making composite-filter components of the kind claimed in claim 5 comprising an intermittently rotatable disc having a number of holes spaced around a circle concentric with its axis, the thickness of the disc being substantially equal to the length of a double-length filter plug and two similar but thinner discs overlapping the first disc so that three holes, one in each disc, can be brought into alignment, means for inserting a double-length plug into a hole of the first disc, means for inserting a single-length second filter into a hole of each of the second discs, means for applying adhesive to the filter plug to cause the elements to become attached to form a double-filter component and means for ejecting the finished article when the three holes are brought into alignment.

12. Apparatus for making composite-filter components of the kind claimed in claim 6, comprising three co-axial intermittently rotatable discs each having a number of holes spaced around a circle concentric with the axis, the middle disc having a thickness substantially equal to the length of a double-length filter plug, the other discs being thinner, means for inserting a double-length plug into a hole in the middle disc by passing it

through a hole in an outer disc, means for inserting a second filter of cotton wool to constitute a wad into a hole in each of the outer discs in alignment with said plug, movable needles adapted to pierce the wool into the plug and means for ejecting the finished article.

13. Apparatus for making composite-filter components as claimed in claim 2 or claim 3, comprising means for feeding double-length plugs and double-length second filters to a travelling web of paper which is thereafter folded around the components to produce a continuous rod, as in the cigarette-making art, which is subdivided into double-filter components or the products claimed in claim 10 by cutting the rod through the middle of second filters.

14. Apparatus for making composite-filter components as claimed in claim 8 comprising drums having flutes to receive crystals or the like arranged on either side of a drum adapted to contain double-length plugs in axial alignment with the flutes and outer drums outside each fluted drum adapted to contain wads and means for inserting the aligned five elements into a tube to make the component.

15. A composite-filter obtained by dividing the components claimed in any of claims 1 to 9 into two pieces.

16. Composite-filter component and apparatus for making them substantially as herein described with reference to the accompanying drawings.

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## PROVISIONAL SPECIFICATION

### Improvements in or relating to Mouthpiece Cigarettes and Filters therefor

I, HEDWIG GAMBLE, a British Subject, of 19, Markham Street, London, S.W.3, do hereby declare this invention to be described in the following statement:—

This invention concerns improvements in or relating to mouthpiece cigarettes of the kind wherein the mouthpiece contains a filtering device and more particularly where said device comprises two filtering elements of different filtering material. Such devices are known and are usually termed double filters and often consist of one filter element made of crepe-paper or crepe-paper combined with an absorbent such as cotton wool or cellulose wadding or the like, and a further filter element consisting of a piece of cotton wool or other absorbent material. When assembled with a cigarette the double-filter is so disposed that the crepe filter is at the end of the cigarette while the wool filter lies between the

crepe and the tobacco. The addition of the wool filter gives a better filtering effect than the single crepe filter commonly used, but double filters as at present made are not nearly as effective as they might be and it is desired to improve them.

Although crepe-paper filters have some filtering effect, it is obvious that, owing to the character of the crepe-paper, it is impossible to make all the smoke pass through in filtering contact with the material. Crepe-paper can only be used with the crepe lines and the resulting channels parallel with the path of the smoke from the tobacco to the mouth. The creping of paper is not regular and, therefore, it is unavoidable that the channels formed by the creping comprise large and small ones, so that a part of the smoke can pass quite unhindered and unfiltered through some channels. Because of this, only a certain



amount of filtering effect can be obtained.

Filter material consisting of layers of crepe-paper and absorbent material such as cellulose wadding or cotton wool cannot improve the filtering very much because the crepe-paper forms the body of the plug and, therefore, channels must exist for a free passage of a certain amount of smoke, which reaches the mouth unfiltered and contains all the impurities of the smoke which are detrimental to health and which, theoretically, should be completely absorbed by the filter. As a crepe filter, with or without absorbent material, is a comparatively rigid body it will be termed herein a "filter plug" or "plug."

To increase the filtering effect, a further filter consisting of a piece of cotton wool is provided on the double-filter mouthpiece cigarettes. Cotton wool itself is the best filtering material known as its fibres are interwoven and never straight. The fibres are fine and leave only tiny openings free which, by the nature of the material, are not straight, but wound and interlaced. The path which the smoke must take by passing through the filter is, therefore, long and it must go through numerous tiny passages and contact with the fibres, so that all impurities which are contained in the smoke as tiny particles are deposited on the fibres.

Cotton wool has also been used as a single filter instead of the crepe-paper plug, but without much success. It is not agreeable for a smoker to keep in his mouth a cotton wool mouthpiece which swells when wet. Further, because of the perfect filtering effect, tar products and other impurities of the tobacco accumulate in the wool filter and can form small drops which may reach the mouth, causing the most disagreeable effects. When the cotton wool filter is not put into the mouth by the smoker, then such unpleasantness is avoided and the maximum filtering effect is obtained.

For cotton wool filters, as used in double filters at present, the cotton material is taken off a rope of soft cotton wool, from which a piece is cut and inserted into the cigarette between the filter plug and the tobacco. Such ropes are not only soft, but are irregular in structure and thickness as they are made by rolling raw cotton wool between moving surfaces. A perfect example of such cotton wool is the well known neck-cotton used by barbers, and a similar material is also used for the cotton wool single-filter cigarettes and for double-filter cigarettes as well. A piece of cotton wool is cut off from a rope of the described nature and brought into the cigarette paper tube or cigarette, according to the method of manufacture. By reason of the irregular structure of this rope material, it is obvious that the filter itself must be irregular and often its shape is of such a nature that the piece of cotton wool does not completely fill

the section of the tube or cigarette and a part of the tube section is without a filtering medium. Sometimes the wool filter is only on one side of the section, while the other side or part of the section is without any filtering medium. Because of such defects, the filtering effect is decreased and the object which is to obtain a perfect filtering effect is not attained.

Some manufacturers of filter tip cigarettes impregnate the cotton wool with chemicals which should absorb even more nicotine and impurities than the two filters themselves, and it is easy to understand that it is essential for this purpose that the cotton wool should not permit any smoke, even the smallest amount to pass through empty spaces. Also, it is obvious that such an impregnated filter in the mouth is not desirable.

In spite of the indifferent filtering effect of the filter plug previously mentioned, it is by far the most comfortable filter element to put into the mouth, and it enjoys wide popularity. Therefore, the ideal arrangement is to have a plug for the mouth end and an efficient second filter between the plug and the tobacco and the main object of the invention is to provide such an arrangement. But, as explained above, a second filter of cotton wool as at present made, is not good enough and another object of the invention is to overcome the disadvantage of an irregularly shaped cotton wool filter or a filter of irregular consistency, some parts of which are compact, while the other parts are relatively loose.

A suitable filtering element to meet this latter object and made of cotton wool of suitable size, shape and consistency is prepared as described later, and as such an element is not so rigid as the filter plug previously mentioned, it will be referred to as a "filter wad."

There are other kinds of filters known and used in connection with cigarette holders. These filters are tubular in form and fairly rigid, being made of such materials as plastic, cardboard or glass tubes and containing such substances as cotton wool or nicotine absorbing crystals of a suitable chemical salt. In the latter case the tube has discs fitted at its ends to contain the crystals and the discs are perforated to allow smoke to pass through the tubes. It is highly desirable to adapt such filters to cigarettes as many people do not care for using holders but these filters, particularly those containing chemicals are not suitable for putting in the mouth. A further object of the invention is to provide a double filter, one element of which consists of such a filter called hereafter a "tube filter" while the other element which is fitted at the mouth end of the cigarette is a filter plug as previously defined.

According to the invention, there is provided a mouthpiece cigarette wherein the mouthpiece comprises two filtering elements

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consisting of a filter plug at the end of the cigarette and a second filter, interposed between the plug and the tobacco of the cigarette, said elements having a cross-section substantially equal in size and shape to the cross-section of the cigarette. In this way all the smoke must pass through both filters before reaching the mouth.

As such cigarettes are sometimes made by filling a paper tube with tobacco after the mouthpiece has been inserted into the tube, the invention also comprises a cigarette paper tube provided with two filtering elements as set forth in the preceding paragraph.

The second filter may be a tube filter or a filter wad both as herein defined.

In the large-scale manufacture of filter cigarettes, there are two general methods employed, though various minor differences in either method occur as between one maker and another.

The first method which will be called the "rod method" consists broadly in somehow feeding mouthpieces in between tobacco portions in the rod-forming part of a continuous rod cigarette machine, and cutting up the rod to obtain separate cigarettes. Usually double-length mouthpieces are used and spaced apart by double-length portions of tobacco and the final rod is cut through midway of the mouthpieces and the tobacco portions.

The second method, which will be called the assembly method consists in joining a short cigarette to a mouthpiece by gumming a cork tip around the two parts. Assembly is sometimes carried out by winding the tip around the cigarette and mouthpiece, generally using a double-length mouthpiece arranged between two cigarettes and dividing the product into two. But often the assembly is done by joining double length mouthpieces and double-length cigarettes (i.e. twice the length of said short ones) by a tip of cork or paper formed into a band around the components, and the operation is continuous so that a moving composite rod is formed which is cut into separate cigarettes just the same as in the first method.

For both methods it is necessary to feed mouthpieces to the machine, but it is only possible in the known art to feed a single mouthpiece at a time from a magazine or stacker or other container to the rod or assembly machine, and this mouthpiece must be in the form of a plug of a fairly hard nature to withstand the pressure applied to the cigarettes from both sides in order to obtain a proper join either of the cigarette tube, or the cork tip, as the case may be. It is not possible to produce by these methods double-filter mouthpiece cigarettes whereby, in addition to the filter plug a soft piece of cotton wool is placed between the plug and cigarette or tobacco. Even when, instead of a soft piece of cotton wool a pre-compressed piece of

cotton wool or wad which is nearly of plug shape is used instead of a soft cotton wool piece, no known machine permits three piece of filter, i.e. three filter elements to be fed in instead of a double-length mouthpiece. The assembly method by which a double-length mouthpiece is joined with one short cigarette on either side by rolling a glued band of cork or paper round the plug and cigarette ends, also does not permit the feeding in of more than one plug.

A further object of the invention is to provide a mouthpiece cigarette of the kind hereinbefore set forth which can be manufactured by these rod or assembly methods and a mouthpiece suitable for such manufacture.

Further, according to the invention, there is provided a composite mouthpiece comprising two filtering elements consisting of a filter plug and a second filter that is, a filter wad or a tube filter, said elements being held together in a wrapper or tube and substantially of the same cross-section, as the tube, whereby the elements may be handled in the same way as a single filter or mouthpiece.

Again, according to the invention, there is provided a composite mouthpiece as set forth in the preceding paragraph, and of double length comprising two of said second filters within the tube, separated by a double-length filter plug.

The neighbouring ends of a wad and a plug may be attached by adhesive or by the piercing method where a needle or the like is driven through a wad and into the plug where it carries a few fibres of the wad, and for some pieces the elements may be joined in this way, without having a surrounding tube. In the case where a filter plug has a tube filter next to it, the two elements are best assembled by enclosure in a wrapper or tube.

The invention also comprises mouthpiece cigarettes having composite mouthpieces as above set forth.

The manufacture of mouthpieces comprising a filter plug and a filter wad and cigarettes or paper tubes having such mouthpieces will now be described, whereafter the manufacture of the mouthpieces having a filter plug and a tube filter will be briefly mentioned.

The filter plugs are made in any usual manner and need no further description.

For the filter wads which are to be inserted into cigarette paper tubes, a piece of pre-pressed and consistent cotton wool is used. One type of such cotton material is known as "cotton wool rolls" and is in use for many other purposes, e.g. by dentists and the medical profession. This material which is starched, pressed and baked as noted below, is in rod form, absolutely round-shaped and it can be made to a diameter which fits perfectly into the tube of a cigarette in the same manner as a crepe-paper plug. Such compressed cotton wool can either be applied to

the machine in the form of rods and cut in the machine to the required length, or loose cotton wool can be made into rod shape by the above-mentioned process in direct combination with the machine which is making the mouthpiece cigarettes and the two manufactures perfected in one operation.

To ensure that the compressed cotton wool is firmly kept in position in the tube or cigarette, it is first made to a diameter slightly larger than the diameter of the cigarette, and during the operations it is further compressed to a diameter slightly smaller than the diameter of the cigarette, so that the filter wad can easily slide into the paper tube whereafter, due to its elastic nature, it expands when released in the interior of the tube, and is thus firmly gripped by the tube and kept in the proper position. The wad and the rod from which it is made may have an outer layer of cellulose, which is pressed, starched and baked to provide a wad of a certain stiffness and help to retain the wad to shape.

A cotton wool filter of perfect round shape can also be obtained by pressing a soft cotton rope with pressure rollers and inserting the rod into a cigarette paper tube which keeps the cotton filter in the correct shape. The same type of filter can also be made by using a similar process as on continuous rod cigarette making machines. The rope is brought with a cigarette paper web on to a moving band, fed through a garniture which forms the round shape. Glueing or crimping of the seam of the cigarette paper edges is carried out at the same time which results in obtaining an endless rod of a cigarette paper tube filled with compressed cotton wool which rod is finally cut into the required filter-lengths to provide the wads.

Filter wads made as just described are also suitable for wrapping up in a tube with a filter plug, e.g. two wads separated by a double length plug for the formation of the composite mouthpieces to be used in the rod or assembly methods of making double-filter mouthpiece cigarettes.

The joining together of filter plugs and filter wads to form mouthpieces can be achieved in different ways. One way which is considered as the simplest and best one is described first. Three side by side discs whose combined width is approximately equal to the length of the mouthpiece to be made are rotating intermittently. All three discs have a number of holes parallel to their axes and equally spaced to around their axes to receive a filter element. The middle disc rotates on one shaft and the other two together on another parallel shaft. The distance between the two discs rotating on one shaft is such that it is slightly greater than the width of the centre disc. The distance between the two shafts is such that in one position three holes,

one belonging to each of the three discs, are in alignment.

Into one hole of the middle disc, a piece of crepe-paper plug or filter plug of double length is pushed in by any known means, e.g. a filter rod formed by rolling or pressing is pushed into the hole and cut, whereby the cut piece remains in the hole. This operation is performed while the disc is still, or at one station. The width of the middle disc is slightly shorter than the length of the filter plug. At another station of the discs a drop of glue is provided on the ends of the plug at both sides of the disc by any means, such as a pad, glue roller or the like.

Into one hole of each outer disc, a piece of soft cotton wool or a piece of a compressed cotton wool rod is inserted while the discs are still, or at another station. This operation can also be done by any known means; the compressed cotton wool piece in the same manner as the crepe-paper plug; the piece of soft cotton wool in a similar way by cutting a piece off a rope of soft cotton wool and pushing it into the hole by a pusher.

When the said holes of all three discs reach the station where they are in alignment, a pusher from outside pushes all three pieces together through the discs and out at the other side, and by the pusher action the three pieces are further compressed owing to the resistance of the walls of the holes. They are tightly pressed together and the glue sticks the three parts together to form one unit or double-length mouthpiece. From this position, the double-length mouthpieces can be assembled in a stacker or brought direct into the machine which assembles these mouthpieces with a tobacco rod or a cigarette, to make double-filter cigarette.

The use of glue can be avoided by joining a crepe-paper plug together with two filter wads of soft cotton wool. Here the two cotton wool pieces on each side of the plug can be pierced in by a needle into the ends of the plug in a known way, so that some wool fibres penetrate the plug and hold the wool in position.

In this case the three discs can be mounted on one shaft and rotate together. At one station the double-length filter plug is inserted in the hole of the middle disc through the corresponding hole of one outer disc. At another station one piece of soft cotton wool or a wad is fed into the holes of each outer disc. At a subsequent station both cotton wool pieces are pierced into the ends of the plug, and then finally in another station the combined plug and filters are pushed out to be further used as above, thus providing a double length mouthpiece.

The inventor further claims the novelty of producing a composite mouthpiece by the so-called rod method. Here, on to an endless band, by any known way, a piece of cotton

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wool of double the length of the cotton wool filter in a double-filter cigarette is alternated with a piece of pre-formed crepe-paper plug of double-length. The resulting rod is cut through midway of the wool sections to produce double-length mouth-pieces.

The plug can be cut off from a long plug in the form of a rod and brought on to the band, or it can be formed direct in the machine by pressing or rolling a piece of crepe-paper into the round shape. The piece of cotton wool can be cut off from a rope of cotton wool or from a rod of pre-compressed cotton wool.

The band is moving together with a band of cigarette paper on top, as on all cigarette machines, and the band, cigarette paper web and the continuous stream of alternate plugs and cotton wool pieces go through a garniture with the usual glueing apparatus which forms an endless rod which is then cut by any known cut-off arrangement into combined filter plugs in the middle of each cotton wool filter or wad. Thus, a short rod or double-length mouthpiece is obtained, consisting in the centre of a plug of double length, like the plug on the double-filter cigarette which is joined on each side with a piece of cotton wool or a cotton wool filter.

To achieve a tight join between the plug and cotton wool filter elements, there is provided above the band at a position in advance

of the garniture a roller which rotates with a higher speed than the speed of the moving band. The roller has such a diameter that it touches the plug when it moves along and passes beneath the roller. By its greater speed it pushes the plug forward on the band until it is a certain distance from the plug in front and compresses slightly the intervening cotton wool filter.

Instead of the roller, any other means of accelerating the speed of the plug in relation to the speed of the moving band can be used.

The manufacture of a composite mouthpiece where the second filter is to be one of the tube filters previously mentioned, is best conducted by the disc method in much the same manner as where filter plug and filter wad material are to be joined, as it is not possible to make a continuous rod of the elements, since it is necessary to keep the tube filters where made of glass or plastic, in their original form and cutting is out of the question anyway, even if the contents of the tube were of some different nature. Where the tube filter is a card tube fitted with wool or the like, the manufacture can be done by the rod method for the tube is not very thick as a rule, and can be cut like a cigarette rod.

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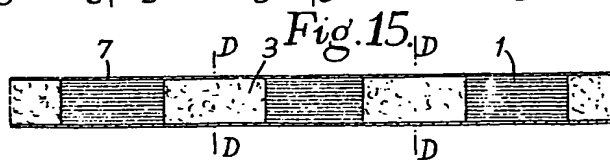
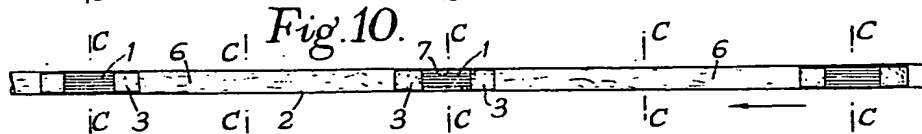
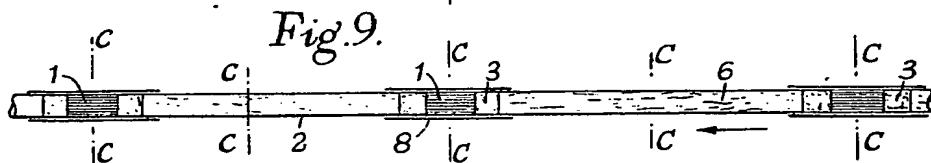
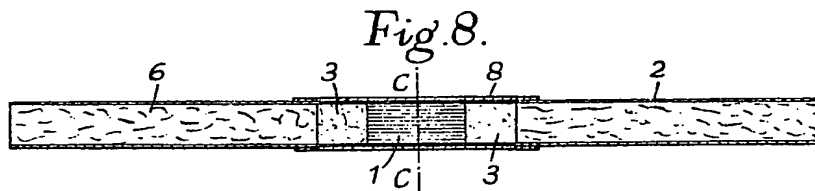
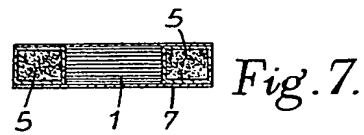
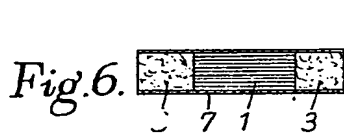
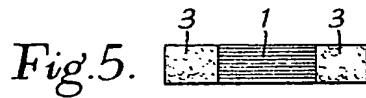
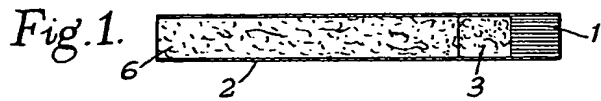


Fig. 11.

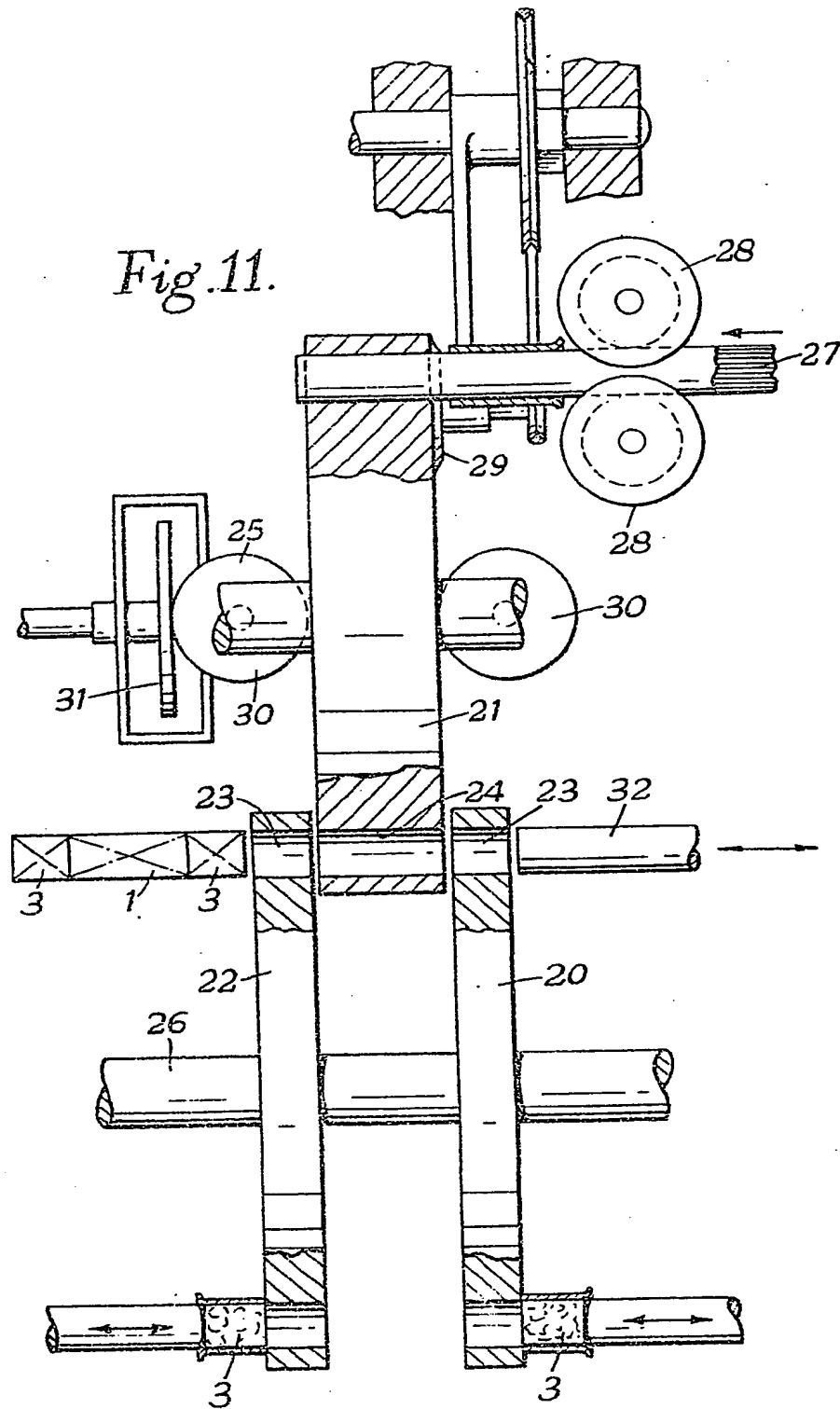


Fig.13.

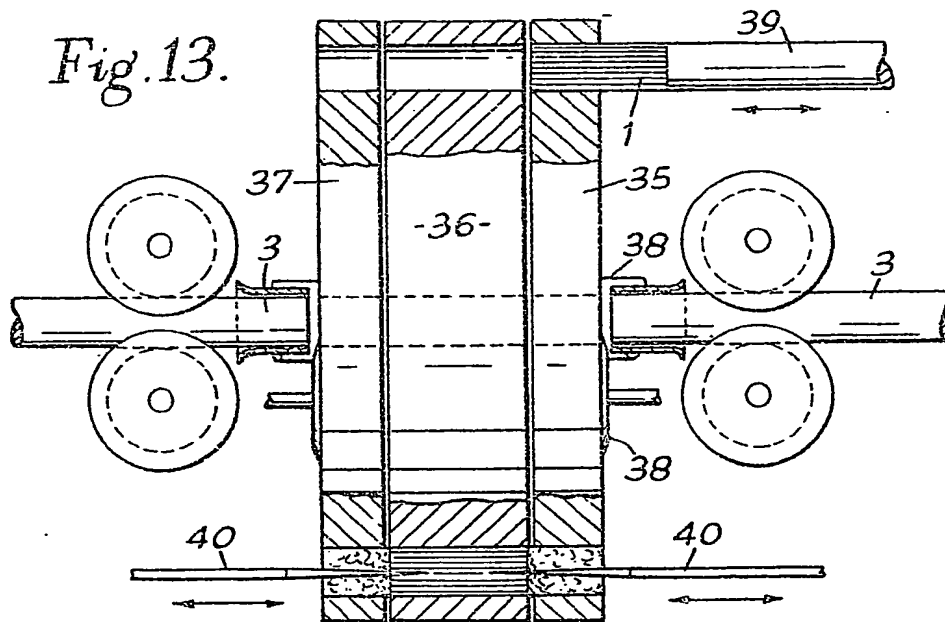
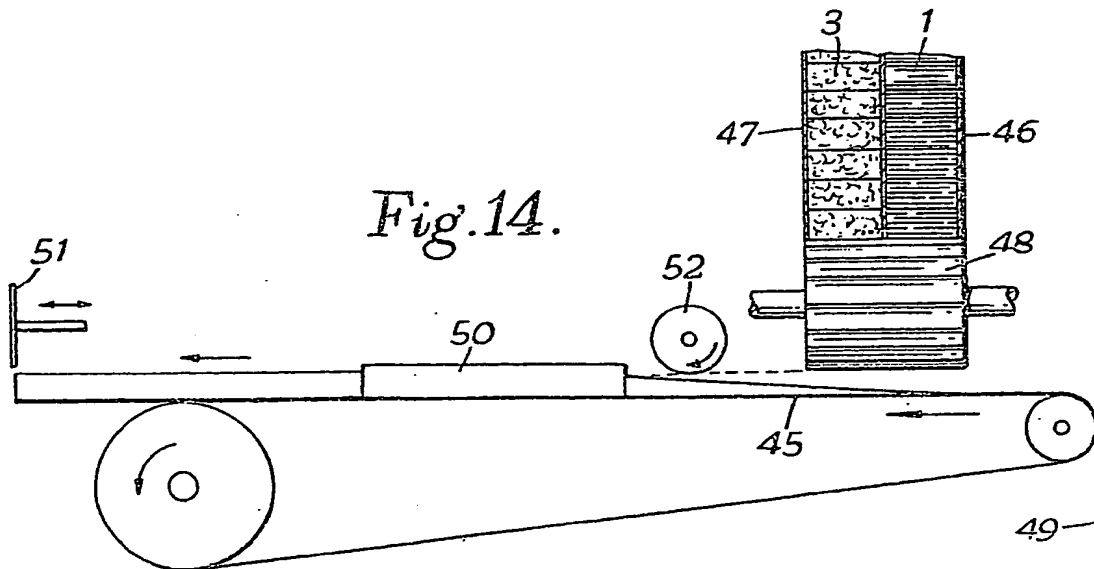


Fig.14.



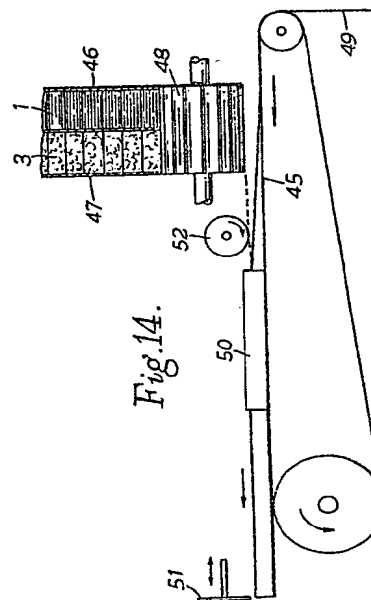
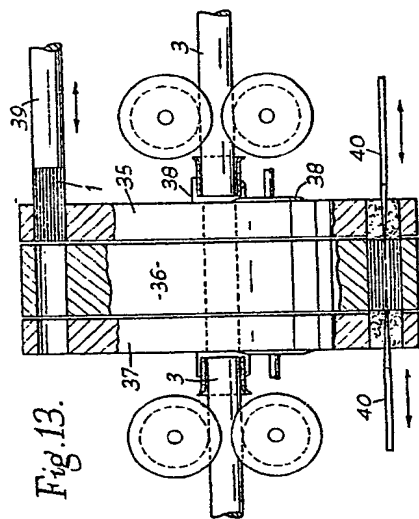
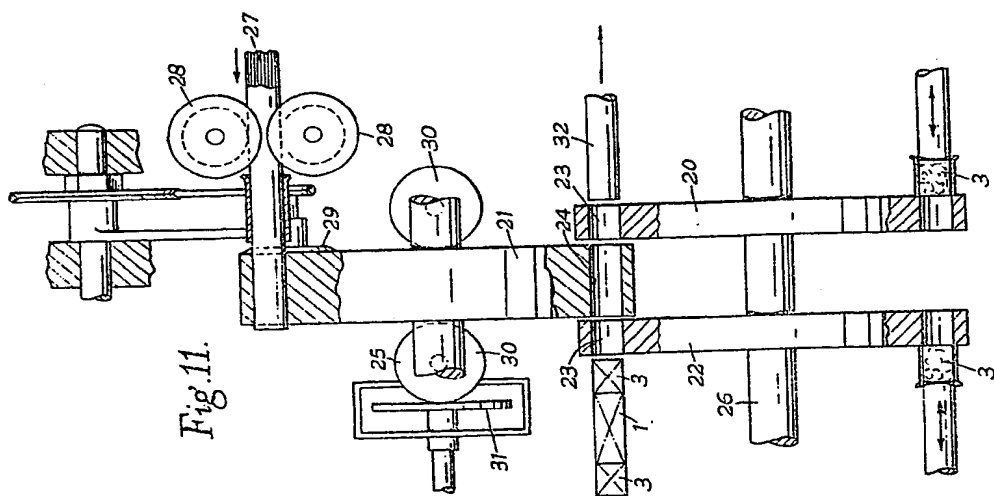
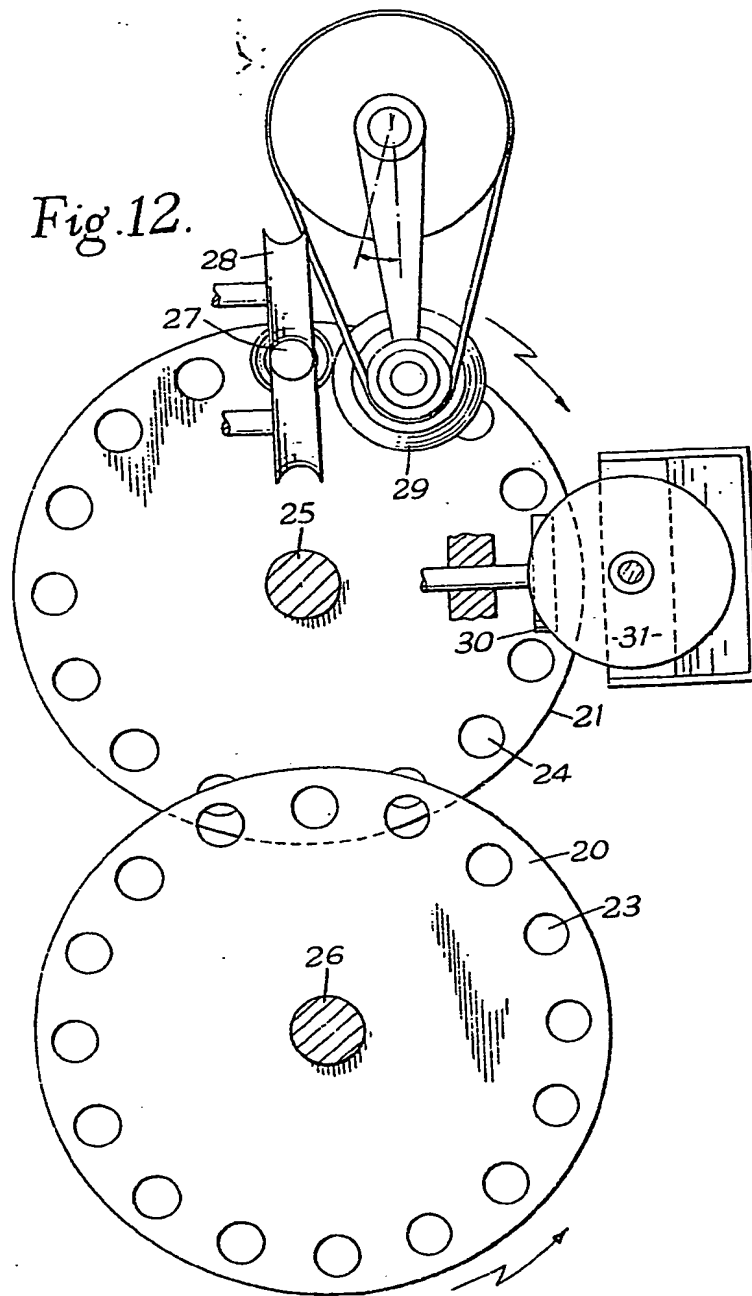




Fig. 12.



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COMPLETE SPECIFICATION

5 SHEETS

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SHEETS 3 & 5

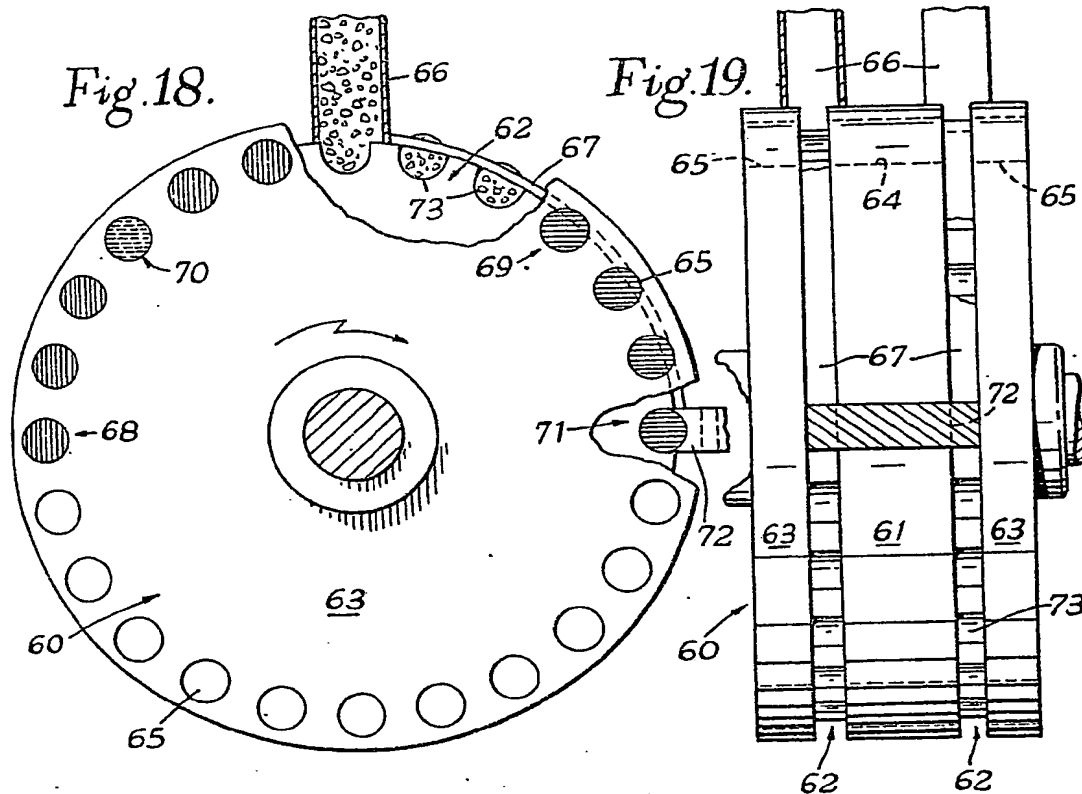
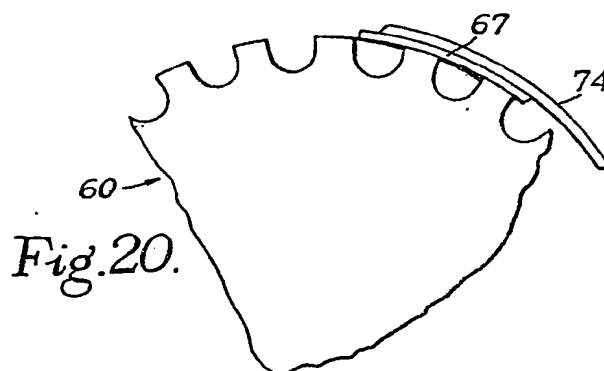


Fig. 17.

Fig. 16.



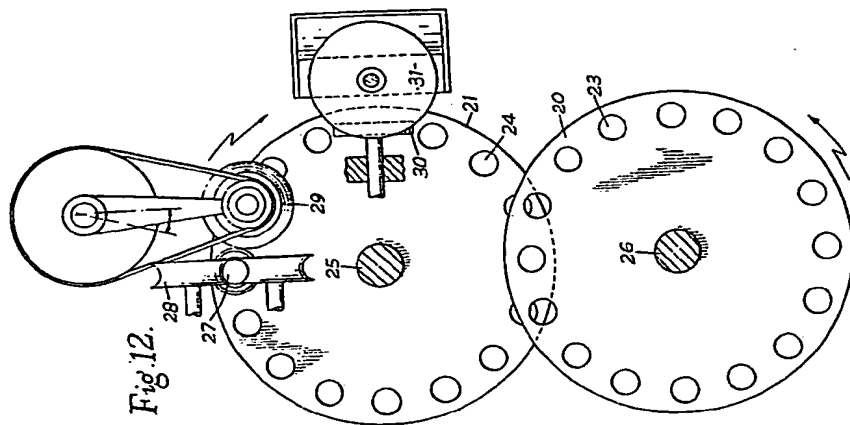


Fig. 12.

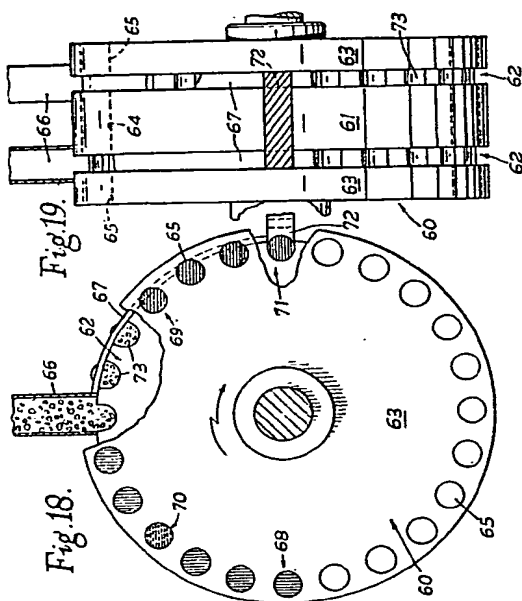


Fig. 18.

Fig. 19.

Fig. 17.

Fig. 16.

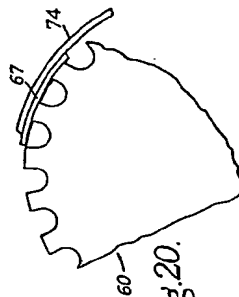


Fig. 20.

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